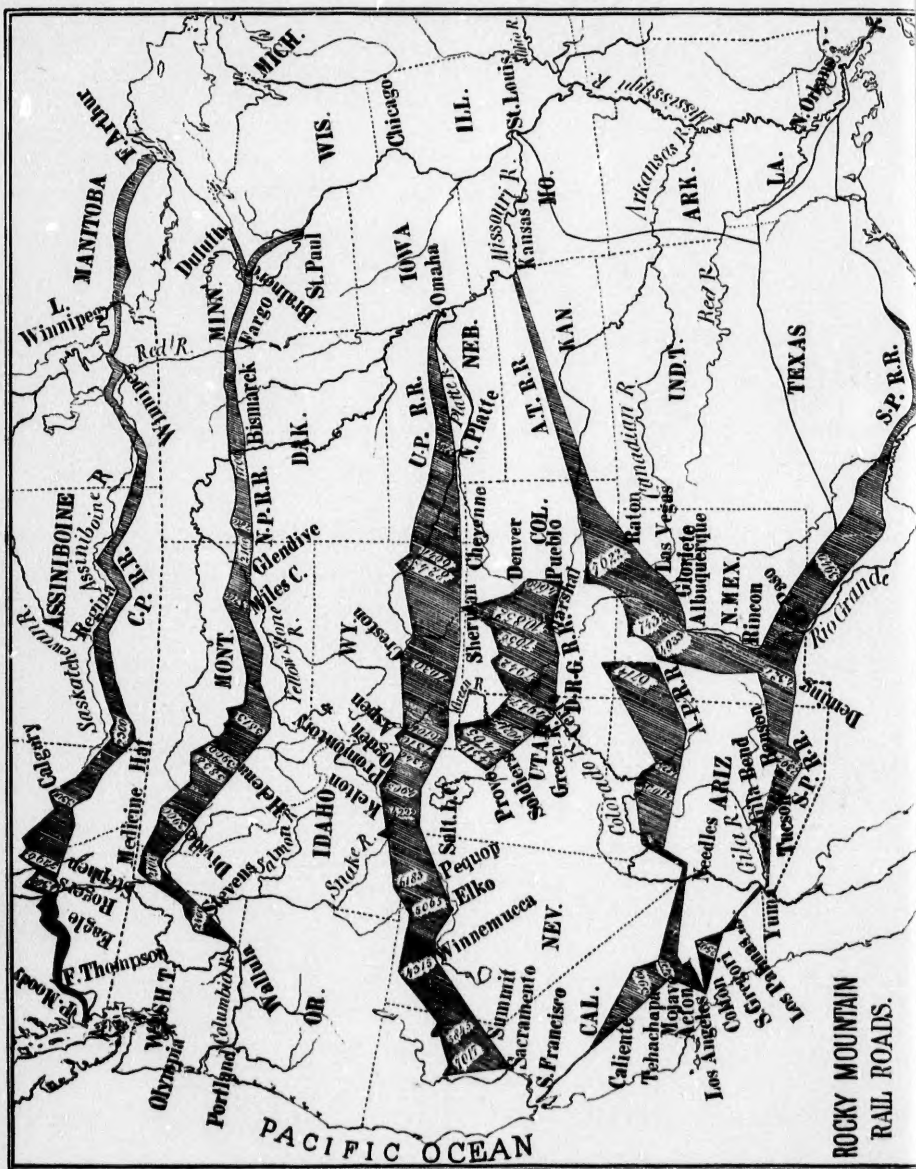




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HISTORICAL AND GEOGRAPHICAL FEATURES OF THE ROCKY MOUNTAIN RAILROADS.

BY

JAMES DOUGLAS.

The Anglo-Saxon race is enterprising, but it cannot lay just claim to being adventurous. Its migratory movements have been made in no spirit of levity, but in very solemn earnest, from strong religious motives, at the bidding of liberty, or under the stress of over-population. Such movements, having their origin in deep racial impulses, have been slow in their inauguration, but irresistible in their progress and permanent in their results. When, therefore, the race occupies territory it rarely abandons it. If it moves less rapidly than more excitable races, its tenacity in the end proves to be in proportion to its inertia.

The progress of the race on this continent is a commentary on these characteristics, and affords material for an interesting chapter in comparative history. Columbus set foot on one of the Antilles in 1492. Within half a century Spain and Portugal sent out over half a hundred discovery expeditions, and explored, with one debatable gap, the whole coast-line of North and South America from Greenland through the Straits of Magellan to the Cedros Islands off the coast of Lower California. Within that period Spain had occupied the principal West Indian Islands, conquered the empire of the Aztecs and the



Incas, crossed our continent from Florida through Texas and Chihuahua to the Pacific, and ascended the Mississippi to the buffalo country. From the Pacific coast of our continent the Spaniards had penetrated through Arizona into New Mexico and Colorado. On the west coast of South America all the country under the sway of the Incas, including a large part of Ecuador, Peru, and Chile, was actually brought under Spanish rule, and Spain and Portugal were already rivals in discovery and occupation on the east coast of the continent. Meanwhile Portugal had doubled the Cape of Good Hope and opened up trade with the East Indies.

That paroxysm of adventurous discovery in the fifteenth and sixteenth centuries hardly touched England. Two expeditions under the Cabots, and another in 1527 to discover the Northwest passage, all comparatively barren of results, were her only recorded contributions; and France played a hardly more conspicuous part, Jacques Cartier's story of his voyages not stimulating the peasantry of France to expose themselves to snow and frost and scurvy, while the unwelcome revelation that his gold was mica and his diamonds quartz crystals removed any temptations which the French nobles may have felt to emulate the methods so successfully pursued by some of their Spanish brethren of recruiting their fortunes by discovery and conquest in the New World. Such a chapter of geographical discovery throws all modern records into the shade.

Compare with it our vaunted discoveries in Africa. It is now a century since Bruce invaded Africa from the north, and forty-four years since Moffat, and thirty years since his son-in-law Livingstone excited the world's interest

by their publications respecting southern Africa. Since then, every section of the mercantile and manufacturing world, and notably the two great branches of the English-speaking race, have had the strongest inducement to cultivate trade with the teeming population of the great lake region, and there has been opened a wide and most fertile field for religious propagandism. Yet of how comparatively small a portion of the Dark Continent have we any knowledge! In fact, the spirit of discovery through sheer love of adventure and of danger, never strong in our matter-of-fact race, seems to be dead except among small sections of the people, influenced by exceptional surroundings, as it can hardly be excited into spasmodic activity by the double motives of gain and religion. Yet when we do explore, we do it to some purpose. The Spaniards explored the continent with the sword in one hand and the cross in the other, but left only trails behind them; we with pick and shovel are obliterating their trails by railroad beds.

In the seventeenth century we find the rôle of discoverers being played by the French. The English have founded a string of colonies along the inhospitable seaboard of New England and the hardly more attractive coast of Maryland, Virginia, and the Carolinas, but their efforts are all directed towards making comfortable homesteads in the wilderness, framing representative systems of municipal government, and securing political rights from the mother country.

A small Dutch colony has planted itself on the Hudson, but home was even dearer to the Dutchman than to his rival the Yankee. Spanish enterprise has been completely stifled by the extortion and grasping colonial policy

of the crown. But the French have occupied Jacques Cartier's discoveries, and French traders hand-in-hand with French missionaries are penetrating the very recesses of the northern continent. Already long before the close of the seventeenth century, and when the English are commencing to open up by sea a trade in furs with Hudson Bay, the French have established missions and trading-posts as far west as the head of Lake Superior, and their *coureurs des bois*, adopting Indian ways and marrying Indian wives, are wandering through the Rocky Mountains and bringing back stories of the sources of the Missouri. The different spirit actuating the different people is well expressed in their varying habit of adaptability. A Virginian Churchman or a New England Puritan populating the West with half-breeds, would be an anomaly we cannot by the utmost stretch of imagination even conceive of.

A century later, at the time of the collapse of the French power in America, we find the English colonies as lethargic as before. The Hudson and Mohawk valleys had brought the English and Dutch of New York into contact with the French, and into competition with the French fur-trade, but the traffic was apparently uncongenial and not pursued with energy. English enterprise here and elsewhere seemed to be sea-bound. It was unable to leap the Alleghanies.

The delusion with regard to the Southwest passage had been dissipated, the Pacific coast to the extreme north explored, and a wide extent of undeveloped continent thus known to be between the two oceans; but what it contained was gathered only vaguely from the stories of the *coureurs des bois*, and such reports of Hudson Bay agents

as escaped from their well-closed archives. Not a single Englishman had described, if he had crossed, the continent from sea to sea.

It seems absolutely incredible that a community of England's hardiest and most intelligent sons should have been content to remain for two centuries hemmed in between the sea and the Alleghanies, uninspired by the slightest curiosity to know what filled the great gap of three thousand miles between their home and the western sea, or to explore, in its northern extensions, the mountain range from which the Spaniards were gathering gold, and freighting their galleons with silver.

Carver in 1766-67-68 explored the head waters of the Mississippi, and described the country north and northwest of the head of Lake Superior, already long and well known to the French. He tells stories of the tribes reported to live to the west of the Shining Mountains, who had gold so plentiful that they made their most common utensils of it. These rumors stimulated him to try to cross the continent. More than one attempt failed before the War of Independence, breaking out, frustrated his and his companion Whitworth's final plans.

Mackenzie, in 1789-93, following the wonderful waterway which, north of the British line, links the waters of Lake Superior with the Pacific by the intervention of but few unimportant portages, traversed the continent from sea to sea, descending to the Pacific by the Peace River.

The American government, to relieve itself from the opprobrium of ignorance, despatched the Lewis and Clark expeditions in 1805. These officers of the U. S. army ascended the Mississippi almost to its source, crossed the divide near the line of the Northern Pacific Railroad,

descended the Clark Fork of the Columbia, and reached the Pacific by the main stream, returning the following year in divided parties so as to explore more territory. Yet so small a portion of the vast region did they describe, and so vague was the information to be derived from other sources, that when Astor equipped his expedition by sea and land in 1812 to secure the fur trade of the Columbia, Mr. Hunt, who led the overland party, was in a *terra incognita* from the time he left the Missouri, which he unfortunately did at a point apparently not far from Yankton, till he reached the mouth of the Columbia. Even such salient geographical features as the course and character of the great rivers were unknown to any member of the party,—hence the cardinal mistake of supposing the Snake River to be the main stream of the Columbia, and of abandoning their land transport-service on a navigable stretch of that river, far above permanently navigable waters.

But while Lewis and Clark were exploring the head waters of the Missouri, another government expedition under Lieutenant Pike first described the whole Mississippi River, previously known only at intervals, from its rise to its junction with the Missouri. He is the same Lieutenant—afterwards Colonel Pike—whose name is so intimately associated with Colorado; for besides giving it to one of Colorado's magnificent mountains, he first, in 1806, ascended the Arkansas, and cutting across the San Luis Park struck the upper waters of the Rio Grande. To him also the world owes its first knowledge of the country drained by the Platte. It was, of course, not till after the purchase of Louisiana, at the commencement of this century, that the government took steps to acquire some

knowledge of the margins of its vast domain. But certain sections have remained so secluded that Custer's military expedition to the Black Hills of Dakota in 1874, only twelve years ago, gave us the first accurate information about that important region.

The old Spanish settlements and towns on the Rio Grande and in southeastern Colorado were linked to California only by pueblos, such as Pueblo Viejo, Tubac, Tucson, and thus a through route from eastern United States settlements to the Pacific by the Santa Fé trail had been always open through Spanish territory. As we have seen, the early Canadian and United States explorers, in looking for roads across the continent, naturally followed the great water-ways of the Missouri and Saskatchewan to the only points on the Pacific, the mouths of the Columbia and the Peace River, which were known as harbors or whither trade relations drew them. Thus the great central zone, where the Rockies attain their grandest development, and are not penetrated or even approached by any navigable rivers, continued to be the dark spot of the continent, utterly abandoned to the red man and trodden by only such daring trappers as Bridger.

As the northern trail was that taken by the earliest emigrants who led the way to Oregon, its advantages as a railroad route were so apparent that as early as 1835 a railroad from the upper Mississippi to the mouth of the Columbia was actually proposed. But the project was not acted on seriously till 1845, when Asa Whitney nearly succeeded in securing from Congress a land grant in aid of the first Northern Pacific, before which more recent grants dwindle into insignificance.

In 1848 the Mormon exodus from Illinois and the oc-

cupation of the promised land of Deseret was completed, and the country was surprised at learning that in the heart of the great American desert a land, flowing with milk and honey, only waited to be cultivated. The government then, in 1849, undertook a survey of the great basin under Captain Stansbury and Lieutenant Gunnison.

In 1848 gold had been discovered in California, in the year of its transfer from Mexico to the United States, and the adventurous spirits of both hemispheres flocked thither. To most, the straightest road was the best. Neither the high walls of the Rockies nor the snowy summits of the Sierra Nevada could deter them. California, not Oregon, henceforth became the objective point of the emigrant, and railroad projects now pointed to California, not to Oregon.

The government in 1852-54 sent out surveying parties in search of railroad routes across the mountains. Their work as embodied in the famous document issued by the war office (Jefferson Davis being Secretary) between 1855-60: "Reports of explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean," is as follows:

(1) A route was surveyed under Governor Stevens along the 47th parallel, which nearly corresponds with that now followed by the Northern Pacific.

(2) Fremont, Stansbury, and Beckwith surveyed the country between the 41st and 43d parallels, and proposed a route not widely different from that selected for the Union and Central Pacific railroads.

(3) Captain Gunnison lost his life at the hands of Indians, or Indians and Mormons, while trying to detect a

practicable route through the sea of mountains amidst which the Denver and Rio Grande railroad now runs between Pueblo and the Salt Lake valley.

(4) Lieutenant Whipple surveyed the country now opened by the Atlantic and Pacific railroad.

(5) Lieutenant John Pope described that route now occupied by the Southern Pacific railroad, which the Secretary of War recommended as the most desirable on the score of length, climate, and gradients.

The State of Missouri was the first to charter a trans-continental route, under the name of the Missouri and Pacific R. R. Co. It was to start from St. Louis, and after running southwest, to follow the 36th parallel through the present Indian Territory to Santa Fé, and thence across to the Pacific. The civil war frustrated this scheme, but hastened the accomplishment of another. To build a road through a region within the radius of active war was hazardous. Yet California, isolated from the rest of the States, it was seen, must be brought within rapid reach of the central power. Hence the organization of the Union and Central Pacific Cos., and the liberal assistance tendered them by government to build a road from the Mississippi to the Pacific, far north of the strife then raging. The charters were signed in July, 1862; the first sod of the Central Pacific was turned on the 23d of February, 1863, but work was not commenced on the Union Pacific till the 12th of November, 1865, after the immediate cause for urgency had passed. Fourteen years, or to July 1876, was the limit of time allowed by the charter for the completion of the joint enterprise, but the eastern and western sections met, and the last spike was driven at the station of Promontory, on the 10th of May, 1869.

This station is 1084 miles from Omaha, but only 850 from San Francisco. Yet taking into account the much greater engineering difficulties which beset the Central road in crossing the Sierra Nevada, than those which obstructed the Union road in the Rocky Mountains, as much credit is due to the one as to the other.

Before the Central road had been even commenced at both ends, in 1864, the Northern Pacific R. R. Co. had obtained a charter. Governor Stevens' survey in 1853 of the Northern route had proved its practicability, but this company organized by Mr. Perham sought in vain for financial assistance till Jay Cooke & Co. came to its rescue and effected thereby their own ruin. Construction was commenced in 1870, but owing to many financial vicissitudes the road was completed only in 1883.

Before this the Southern road had been opened from end to end. While the Texas and Pacific Co., chartered in 1872 to construct a road from Fort Worth in Texas to San Diego on the Pacific, was languidly building from the east, and vigorously soliciting government aid, the large stockholders of the Central Pacific were constructing a line with their own resources, along the proposed route of the Texas and Pacific from the California end. And thus before the Texas and Pacific had laid their tracks through the State of Texas, the Southern Pacific had occupied Lower California, Arizona, and New Mexico, and united with the Texas Pacific proper at the end of 1882. Contemporaneously, the Atchison and Topeka, originally a road looking for support to the agricultural resources of Kansas, had crossed the Raton spur of the Rockies, earned the right of adding Santa Fé to its title, and by connecting with the Southern Pacific at Deming,

created another Rocky Mountain railroad. Since then this company has made an independent outlet for itself to the Pacific at San Diego, by the Atlantic and Pacific R. R. and the Colton Branch.

While these broad-gauge roads were seeking for valleys and easy grades by which to cross the mountains, a narrow-gauge road, controlled by officers, and constructed by engineers, with very broad-gauge ideas, the Denver and Rio Grande R. R., was successfully combating difficulties and scaling heights which only lavish expenditure of money, handled by the highest engineering skill, rendered superable. The road was intended to be a link through the valley of the Rio Grande, between the Southern and Central systems, but the Atchison and Topeka forestalled it. The management then divided its energies between fighting the Union Pacific and reaching the most inaccessible regions in Colorado. The marvellous feats which its builders have really accomplished are as wonderful as those the Union Pacific was supposed by popular imagination to have performed.

The year before last (1884) this road finished laying its tracks, from Denver to Salt Lake City, through the very heart of the mountain region.

These are the principal though by no means the only great Rocky Mountain railroad enterprises, undertaken and completed since 1863. But we must pass on from this historical sketch to trace the geographical features of those sections of the continent which they traverse, as exhibited in their profiles.

The Rocky Mountains, including the whole system of mountains and plateaus from the plains as far as the Pacific coast, attain their greatest development in height

and width along the 41st parallel, which nearly coincides with the line of the Union and Central Pacific R. R., and there exhibit with marked prominence all their features, the principal of which are high and steep eastern and western chains, the Rocky Mountains to the east, and the Sierra Nevada to the west, enclosing an elevated plateau corrugated by diagonal minor ranges. To the west of the western rim is a coast valley, itself protected from the sea by a Coast Range. This structure, with such variations as nature loves to indulge in without departing from uniformity of type, is maintained along the west coast of both North and South America, as well as in the structure of other continents.

THE UNION PACIFIC RAILROAD.

The profile of the Union and Central Pacific roads exhibits these features better than that of any other road. The plains rise by a grade, so easy as not to be appreciable to the eye, from 968 feet at the Missouri to 6,038 feet at Cheyenne, or 5,070 feet in 516 miles, the country changing with the decrease in rain-fall from the rich fertility of the Nebraska prairies, to grazing lands, dry and seemingly valueless, but able formerly to support the buffalo and now their tamer successors.

At Cheyenne the Black Hills rise abruptly from the plain, but like all hills looked at from below, the steepness is illusory, for the train scales them to Sherman, a point 8,235 feet above the sea, in thirty-three miles, and then descends into the Laramie plains, whose average elevation is about 6,500 feet. This is in reality the most northerly of the parks, though not generally ranked among them. The plains are well watered by rivulets

which flow north into the North Platte, the main stream of which is separated from the plains by a ridge 7,168 feet, over which the road runs before ascending the Continental Divide, here only 7,100 feet above sea-level, and therefore more than 1,000 feet lower than the summit of the Black Hills at Sherman, and but 500 feet above the average level of the rolling plains which intervene. To the north and south, high mountain ranges break the surface of the plateau, but the profile shows what an easy highway nature offered the railway builders across the great basin on this parallel. It was always the Indian's and trapper's trail, and was in 1852 suggested by Lieut. Gunnison as a feasible railroad route before the official survey.

To the north and northwest can be seen the Seminole Mountains, the Sweetwater Range, and in the far distance the Wood River Mountains; to the south the Elkhead Mountains, and away to the southwest the spurs of the Uintah Range. From the summit there is a down grade to the Green River, for sixty miles of the way along the Bitter Creek, through an utterly desolate region, the cliffs on either side encroaching close on the valley. The sandstones which here accompany the coal that underlies Wyoming to east and west of the Divide, favor the sterility which elevation and drought alone are enough to produce, but add to the scenic effects by weathering into picturesque bluffs. The Green River, one of the great branches of the Colorado, is the first and only large stream which flows into the Pacific, along this parallel, till the Sierra Nevada is passed; the river and lake system of each section of the great basin—the Utah section and the Nevada section—being self-contained.

The Uintah Range, whose axis is nearly east and west, is now the conspicuous feature to the south, its sides covered with forest, and at its base Beaver Creek, which was Bridger's favorite trapping ground for the American Fur Company as far back as 1820. Up the Big Muddy the rail now ascends a spur of the Uintah, crosses it at Aspen at an elevation of 7,835 feet, and descends into the valley of the Bear. This stream, like many others in the Rockies, doubles on its own course. It rises to the south of the track, flows north, outflanking the Wasatch Range, and returns south to discharge, after a course of 230 miles, into the Great Salt Lake, not over sixty miles west of its source. But the railroad builders tunnelled the high jagged range at Wasatch, and carried the track through the wonderful rock scenery of Echo and Weber Cañons, down the steep western slope of the Wasatch to the Salt Lake valley at Ogden.

Five roads radiate from Ogden: the Union Pacific towards the east; the Central Pacific towards the west; the Denver and Rio Grande towards the southeast; the Utah Central runs due south down the valley; and the Utah Northern as a narrow-gauge road due north through the eastern section of Idaho into Montana, where it connects at Garrison, at the western foot of the Rocky Mountains, with the Northern Pacific. But we must travel forward westward over the

CENTRAL PACIFIC.

From Ogden westward the Central Pacific, after crossing from the Utah into the Nevada depression of the Great Basin, descends by easy grades to the eastern foot of the Sierra Nevada, through a region even more desolate

than that traversed by the Union, between naked mountain ranges, over long stretches of rolling sage-brush plains, hardly redeemed from utter sterility by a ribbon of verdure on the banks of the Humboldt River. The railroad follows the valley of this river from Moore Station for a distance of 350 miles till it enters the Humboldt Lake, and flowing thence, loses itself in the sink of the Carson. The profile shows this westerly basin, occupied by the Humboldt and other lakes, to have almost the same level as that of the Great Salt Lake. Into it flow the Humboldt from the east and the Carson and Truckee rivers from the west, all perennial streams carrying large bodies of water; but the thirsty sands and the rapid evaporation from the lakes, which these rivers form, drink up all they contribute. Carson Lake, which, like the Great Salt Lake of Utah, is the residuary recipient of the whole river and lake system of this portion of the Nevada desert, has no outlet. The valley of the Truckee was selected by the railroad engineers as the most feasible route out of the basin. The track, therefore, after traversing from Lovelocks to Wadsworth, about 63 miles, a desert region white with alkali, and full of solfataric activity, bubbling with hot springs, saturated with soda and brimstone, and productive of brimstone, enters the valley of the Truckee, and following its narrow channel, too barren generally to produce much, even with irrigation, reaches the town of Truckee, a distance of 62 miles, gaining an elevation in that distance of 1,742 feet. At Truckee commences the pull up to the summit, a distance of only 14 miles, in which 1,198 feet of elevation are gained. The scenery of Donner Lake, which the train skirts after leaving Truckee, the piles of mountains rising more than

3,000 feet above the tunnel by which the road cuts through the crest of the Sierra, and on the western side the glimpse of the birth and growth of the streams which dash down through the forests to feed the Sacramento, give this section of the road pre-eminence in beauty; but what between tunnels and 50 miles of snow-sheds, the traveller is kept in a state of constant irritation, as angry as when in New England he expects to get the full view of a beautiful river and enters a covered bridge. Down the western slope of the Sierra the train speeds from the summit at 7,017 feet to Colfax, a descent of 4,595 feet in 51 miles, through the pines into the oak glades and down to the plains. The relief of passing at a bound from the most desolate spot on the continent, the Humboldt Desert, into one of the most fertile of the world's valleys, that of the Sacramento, is intense. The Coast Range does not appear on the profile, because the railroad terminates on the Upper Bay formed by the junction of the Sacramento and the San Joaquin rivers, and this great harbor is carved out of and sheltered by the Coast Range, on whose hills San Francisco itself is built.

THE DENVER AND RIO GRANDE RAILROAD.

The Denver and Rio Grande, as already stated, surpasses all competitors in the feats of engineering its builders have compassed. Each of its branches was, at the time of construction, the most remarkable deed of daring yet attempted, and each successive effort has surpassed its predecessors in boldness of conception and execution.

Our map would be covered to confusion were we to attempt to show each of the Denver and Rio Grande lines.

The first mountain branch was that over the Sangre de Cristo Range by the Veta Pass, thence across the San Luis Park and down the valley of the Rio Grande to near Sante Fé. From this, two feeders diverge to the San Juan and to other as inaccessible mining localities, heretofore deemed difficult of approach by ordinary vehicles.

But what interests us most is the Pueblo and Salt Lake section, which forms one half of another trans-mountain route.

In its career it cuts the Rockies at their highest and wildest, to the west of Pueblo, taking advantage of the Arkansas to reach the water-shed of the continent at Marshall Pass.

The Royal Gorge, in the Grand Cañon of the Arkansas, is the portal which admits the traveller from the plains into the recesses of the mountains where the river receives its life. Above the cañon, the valley widens, and is productive of grasses and of such vegetables as the great altitude permits of coming to maturity. At Salida the branch to Leadville continues up the Arkansas, but the main road ascends the Saguache range to the Continental Divide. This is crossed by Marshall Pass at an elevation of 10,820 feet by grades reaching 220 feet to the mile.

From this great elevation the eye wanders far and near over forest-clad mountains with rounded outline, less startling, perhaps, but more pleasing than the bare sides and jagged profiles of the Eastern and the Sangre de Cristo Ranges, for colors and curves are principal elements of beauty. If they do not elicit wonder, they excite pleasure. Nature when clad in neutral tints is bereft of half her charms. Looking from this vantage ground it would

seem impossible that the railroad could find a path through the network of ranges, the peaks of which tower to north and south and east and west to elevations of 12,000 and 14,000 feet—not one peak, but many. Yet though the road follows river-courses they are not always river valleys, but deep, steep gorges, over whose stony sides the engineers had to be suspended in locating the road, and the miners in dislodging the rocks to gain a footing for the road-bed.

The Tomichi River, the main confluent of the Green, is reached almost at once after the Divide is passed, and where this branch unites with its northern sister to form the Gunnison, is rising the city of Gunnison, the future metropolis of the region, at an altitude of 7,680 feet. Below Gunnison the river cuts through mountain and plateau, creating the Black Cañon of the Gunnison, less gloomy than the Grand Cañon of the Arkansas, and enlivened by a greater variety of rocky outline, for the gorge has been carved out of limestones and sandstones, instead of riven through the old crystalline rocks. It is broader, and is streaked with color derived from the weathering of the rocks, as well as from vegetation. The Gunnison Cañon becomes more rugged below Gold Creek, and rather than follow it the road crosses Squaw Mountain and joins at its western base the Uncompahgre branch of the Gunnison. This it follows to its junction with the main river at the town of Delta, and it still keeps to this highway of nature across the Grand Mesa till it unites with the Grand River at Grand Junction. For 200 miles farther westward the road ascends a series of barren steppes before surmounting the Wasatch and entering the Great Salt Lake Valley.

THE SOUTHERN PACIFIC RAILROAD.

The Southern Pacific is the only United States road whose termini are on the two oceans—the eastern at New Orleans, the western at San Francisco. It runs through the swamps and across the bayous of Louisiana, over the low coast lands of Texas to Houston, and thence traverses from east to west its fertile cotton lands to beyond the old Spanish town of San Antonio, where the land grows less fertile. At 170 miles from San Antonio the road enters the Cañon of the Rio Grande. Through this it is built on benches overhanging the river, and within a stone's throw of the Mexican shore, till it reaches the undulating limestone plateau through which the river has cleft this narrow trough. The train emerges from the cañon at Langtry, which is always guarded by a company of U. S. cavalry, as it is the only ford across the Rio Grande for a distance of 150 miles. On the plateau the scenery differs from that of the plains to the north only in the vegetation which clothes it. We are on the "*Llanos estacados*," the "Staked Plains" of other days. Though no river runs for hundreds of miles through this dreary waste, springs occur, and water in many places is pumped to the surface to supply the cattle and sheep which roam over this scorched wilderness. These, though necessarily few in number to the mile, are an immense multitude in the aggregate. Not a hill breaks the horizon for more than a hundred miles, but the road ascends gradually to Sanderson, where short isolated ranges commence to rise out of the plateau, and the mountain scenery assumes the aspect which it henceforth bears along the line of road, all through New Mexico and Arizona, till the Colorado is passed and the Yuma Desert is entered.

The Rocky Mountains, as we have seen, attain their grandest development in Colorado. In northern New Mexico they still maintain their character as an unbroken Cordillera. But further south it becomes impossible to identify the features which we have seen the continent to possess along the 41st parallel. In western Texas, central New Mexico, and in northern and central Arizona there is a complicated system of short ranges so interlocked as to leave but narrow valleys between; while in the southern portion of these territories similar ranges, with a general northeast and southwest axis, spring from the lofty plateau, whose average elevation is about 4,000 feet, in isolated mountain masses, with great stretches of intervening plain. The Texas Pacific Railroad has crossed the same plains to the north of the Southern Pacific, and entered the same mountain scenery in its straight course from Fort Worth to Sierra Blanca, where, at 91 miles from El Paso on the Rio Grande, it unites with the Southern Pacific. Westward the single railroad winds among these miniature ranges without, as the profile shows, any great variation in grade, and yet by a route so tortuous that long stretches are built to reach points a few miles apart. Bare, treeless mountains before and behind, and on either side, close in every view, while yet the train is gradually crossing a plain of sandy or baked reddish soil, sprinkled with tufts of grass and dotted with soap-weed or yucca, bushes of grease-wood, and groves of mesquite, and in places groups of huge cacti and smaller members of the same grotesque family. Only two rivers, the San Pedro at Benson, and the Santa Cruz at Tucson—the latter generally dry,—are crossed between the Rio Grande and the Colorado, a distance of 550 miles.

The Rocky Mountains have been completely shattered, and their scattered fragments seem to strew the plains. They reunite in the Sierra Madre of Chihuahua, immediately south of the line, recover from their disorder, close in their ranks, and present an unbroken front southward to the Isthmus; but in New Mexico and Arizona they have been completely obliterated as a Cordillera.

The Rio Colorado is crossed at sixty miles above its mouth, where it flows between low sandy banks; for the grand cañon has terminated hundreds of miles above, before the river has turned from its east and west to its north and south course. Before reaching the river the country traversed has become, if possible, more forlorn, and desolation reigns supreme. After the bridge is crossed the Yuma Desert is entered. In traversing it the train runs for hour after hour over plains of sand, thirty miles of which are below sea-level. At all seasons a *mirage* is seen as tempting as any which deludes the African traveller. At places the sandy surface is flat, at others it rises into hillocks like the dunes of Holland, stretches of snow-white alkali vary the color, and what vegetation there is partakes of the sandy tint. The San Bernardino Mountains rise steeply ahead, their slopes as bare and rocky as the mountain ranges between which we have been passing now for over 1,000 miles. They represent the Sierra Nevada mountains which, along this zone of the continent, dwindle, like the Rockies, into insignificance. Further south they continue to assert themselves, but still more feebly, in the peninsula of Lower California, before being lost in the Pacific.

As we ascend the eastern slope of the San Bernardino range the desert merges into arable land, but the sum-

mit of the Gorgonia Pass is so speedily reached that the train seems to leap as if by magic from dreary sterility into the orange groves of Colton and Los Angeles, and the rich verdure of the San Fernando Valley. Here the Coast Range to the west is well defined; but the coast valley in which this oasis is enshrined, rapidly contracts to the north, and the Sierra Nevada and the Coast Range coalesce into a network of cross ranges through which the selection of a practicable railroad route was no easy task. That selected passes from the head of the valley easterly through the Soledad Pass into the Mojave Desert, the northerly extension of the Yuma Desert, over which we travelled, and then returns through a maze of mountains over the Tehachape Pass northwesterly into the great longitudinal coast valley. In crossing the pass the grades are reduced by making the road describe the figure ∞ round two adjacent isolated hills forming the well-known loop.

This is the last engineering feature of note, for the road does not again leave the broad fertile plain of the San Joaquin Valley, closed to the east by the high snow-capped wall of the Sierra Nevada, and to the west by the low wall of the Coast Range.

THE ATCHISON AND TOPEKA RAILROAD.

The Atchison and Topeka started as a prairie road, but through its ramifications it has become the most extensive of all the mountain railroad systems. It has stretched in two directions into Mexico, but with these branches we have not to do.

The mountain section commences at Trinidad, Colorado, where the road has risen upon the plains from 765 feet

at Kansas City, to 5,981 feet at Trinidad, in a distance of 636 miles. We have seen that on the line of the Union Pacific, about 180 miles to the north, from Omaha to Cheyenne, in a distance of 516 miles an elevation of 6,038 feet was attained. At Trinidad, in the midst of a coal-field extending to both sides of the Raton Range, the ascent of this spur of the Rockies commences, and is completed in twelve miles by a tunnel at an elevation of 7,612 feet above the sea. The road now issues on those vast rolling plains which spread over northern New Mexico, Texas, and the Indian Territory, and which feed a thousand rivulets that combine to make the Red and Canadian Rivers, discharging into the Mississippi, and the Pecos, which help to swell the Lower Rio Grande. The road proceeds south with the snowy range of the Sangre de Cristo bounding the view to the west. Behind that flows the Rio Grande, and only beyond that again rises the Continental Divide. Over it the line does not pass, for after crossing the plateau for 175 miles at elevations varying from 5,000 to 6,600 feet, it mounts the Sangre de Cristo Range (here the Glorieta), descends into the valley of the Rio Grande, and follows it for 300 miles to the Mexican frontier town of El Paso.

THE ATLANTIC AND PACIFIC RAILROAD.

But at the old Spanish town of Albuquerque a cross-road branches west, which completes the transcontinental character of the Atchison and Topeka. It is really a section of the St. Louis and Pacific, which is itself a survival of the old Missouri road, of which I spoke in the historical sketch. It runs for all the distance between Albuquerque on the Rio Grande, and the

Colorado River, at the Needles, through the most mountainous section of New Mexico and Arizona, at a very high average altitude. The Continental Divide is passed near Coolidge, at an elevation of 7,306 feet, and the road subsequently runs among heavily pine-clad ranges, past the foot of the San Francisco Mountains, parallel with, and at one spot not more than twenty miles south of, the Grand Cañon of the Colorado, and over the southern extension of the Great Basin. The Colorado River crossed, the road traverses the same dreary waste which in the south we knew as the Yuma Desert, and in the north as the Humboldt Desert, ere it joins the Southern Pacific at Mojave station. The Colton branch completes its direct connection with the Pacific at San Diego.

THE NORTHERN PACIFIC RAILROAD.

We have seen that a Northern Pacific R. R. was the first proposed but almost the last built. As now constructed its eastern terminus is at St. Paul. Thence it sweeps for 275 miles over the rich prairies of Minnesota, then spans the Red River of the north, pursues its way due west still through the most fertile farm-land, crosses the Missouri at Bismarck, and sweeps onward again over deep, rich, black soil till the Bad Lands of Dakota are reached near the Montana boundary; a total distance of about 586 miles from its starting-point. The curve of farming land represents, proceeding northward, that of the rain-fall. Here it reaches the very foot-hills of the Rockies. But throughout the whole mountain zone in this parallel the climate is sufficiently humid in average years to clothe the hill-sides everywhere with nutritive grass, and to fill the valleys with perennial streams,—

hence the enormous cattle-ranching capacity of Montana along its entire width of 800 miles.

The Bad Lands are a relief to the traveller wearied by his long journey over these hundreds of miles of prairie. That these prairies have been laid out into immense farms, and are cultivated by machinery, does not increase their picturesqueness, while it removes from them that human interest with which we invest the homesteads of families who are trying to deserve a living from the earth and to return her kindness by adorning her, in their humble way, with trees and fruits and flowers.

The Bad Lands, which the railway guide-books, jealous of the narrow strip of twenty miles being considered unfit for occupation, ingeniously say were so called by the early French trappers because they were *terres mauvaises à traverser*, not, however, *à cultiver*, owe their origin probably to the lignite which underlies them. Here the outcropping beds have become ignited, and by the heat generated have altered the color and character of the adjacent shales and sandstone, rendering them more liable to erosion by water and wind, the combined influence of which has carved the whole country into most fantastic forms. The great eastern buttresses of the Rocky Mountains now loom into view, but the road remains on the prairies, skirting the Powder Range till it strikes the Yellowstone River at Glendive. To its valley it clings for 340 miles, or as far as Livingstone, where this most important of the northern affluents of the Missouri turns southward to draw its waters from the heart of the Rockies and enhance the beauties of the Yellowstone Park. This valley, where followed by the railroad, is narrow, not averaging three miles in width, and enclosed by bluffs sparsely

clad with pine, which, though low, are still high enough to shut out all but glimpses of the Big Horn and Yellowstone Ranges to the south, which have deflected the river from a straight course between its source and discharge. But each of the rivers which flow into it from the south, fed by the great spurs of the main range, the Powder River, the Tongue, the Rosebud, and the Big Horn, remind us of the last desperate struggle of the dominant nation of the north, the Sioux, against the march of the white man between 1872 and 1877, hastened by the progress of this very railway—a struggle rendered memorable by the daring deeds and untimely end of Custer. In this valley also is a memento of Clark, who, on his return journey in 1806, carved his name on a prominent rock and called it Pompey's Pillar—a name retained for the neighboring railway station.

From St. Paul to Livingstone the grade has been easy and the elevation low. But the road after leaving the Yellowstone commences to climb the Bozeman Range, a spur of the Rocky Mountains. It cuts off the summit by a tunnel, at an elevation of 5,565 feet, and emerges in a wild gorge which it follows along the stream of the Gallatin to the base of the range. Here it enters the birthplace of the Missouri, an amphitheatre of great hills where the Gallatin, the Madison, and the Jefferson unite their waters to form this mighty transcontinental river, which thus springs into existence as a stream of considerable size. We follow its banks for thirty miles, but the Rocky Mountains here bar its further progress westward, and it is prevented from reaching by a straight course its destination in the eastern sea by the confused mass of the Little Belt Mountains, round which it sweeps, through

Clark's Gate of the Rockies, due north, over the falls of the Missouri, and thence as a navigable river eastward. But the road pursues its way westward, crossing the Continental Divide through the Mullan Tunnel, at an elevation of only 5,648 feet.

We are now in the golden land, and almost every valley has been turned over and over in search of the precious dust. The beautiful town of Helena, near the foot of the Divide, stands in a wilderness of boulders, heaps and trenches, and the surface of the valleys near Butte, Bannock, and Virginia City, and many another spot, looks like the Bad Lands of Dakota in miniature, tossed out of all shape by the myriads of miners who from 1861, when gold was first discovered in Deer Lodge County, till recently, have extracted from the shallow places of this section of Montana over one hundred millions of dollars. But little is left in this accessible condition, and what little there is will probably remain unmolested, as the Montana miners have ordered away the Chinese.

The Rocky Mountains here, though not of the majestic proportions of the Colorado Range, rise high both north and south of the Mullan Pass. Along this parallel the range seems to have been, as it were, spliced, the Bitter Root Mountains from the south overlapping on the west the main range, which descends from the north. The engineers of the road took advantage of the point where the mass of the range, being thus divided, was reduced in height and a passage was made easy. Tortuously the road ascends the eastern slope of the Continental Divide from Helena at 3,980 feet to the tunnel, affording a magnificent glimpse of the mountains to the south, which enclose the National Park; but the western descent is less

rapid into the valley which carries towards the Columbia the waters of the Deer Lodge Creek, *alias* Hellgate River (the former the name in the farming section of its course, the latter in the mining). The mountains close in,—the Bitter Root Mountains on the left—the main range on the right—till the valley is contracted into a gorge, rendered more sombre by the heavy growth of pines which clothe the rocks; for now that we have crossed the mountains, both plain and hill are forest-clad. Northwest the road runs along the banks of the streams, now swollen into the Clark's Fork of the Columbia, unable to escape westward over the high Bitter Root Range,—bitter indeed to the thousands of penniless prospectors, who three years ago flocked even from the warm southern territories and Mexico to seek for but gather no gold in its snow-clad Cœur d'Alene mines. But where Clark's Fork expands into the beautiful lake of Pend d'Oreille the road finds egress from the mountains and enters the northern extension of the great plateau, which we have traversed in Arizona, and again when crossing the Great Basin on the Union and Central roads. Only here, as the Rocky Mountains point northwest and the Sierra Nevada and their extension, the Cascade Mountains, have a slightly northeasterly trend, the great valley has been crushed in, almost to extinction. It is at this point only 100 miles across, and at less than 100 miles farther to the north it ceases to be well defined. There the Rocky Mountains and the Cascades are built together into the one broad wall, supporting an elevated plateau, against which the waters of the Pacific beat to the furthest limit of the continent.

But though the Great Basin has shrunk to such meagre proportions, its contents have grown in value. We are

far north, but the warm ocean current, flowing from Japan, carries heat and moisture to the coast, and thus the climate of this section of Washington Territory, even east of the Cascades, so assists the fertility of its soil, that the productiveness of this extreme end of the Great Basin almost defies belief. The road cuts diagonally across the basin from the northeast to the southwest, till it strikes the Columbia at Ainsworth.

The gorge which this magnificent river has cut through the Cascades—the representatives of the Sierra Nevada—for a distance of over 200 miles, was taken advantage of by the railroad builders to make their escape to the sea. The only difficult engineering and construction along the road occur in this section, for so precipitously do the banks rise out of the water below to Dalles, that the road-bed had in places to be carved out of the rocky escarpment. The old Oregon trail reaches the Pacific by this route, but the difficulties of road-building were so great that the emigrants never attempted to force a passage by wagon below the Cascades. The railway was the first road of any kind on the banks of this stretch of the lower Columbia.

The Cascades here soar into magnificent proportions, a number of peaks rising above the snow line, as Tacoma, 14,860 feet, and Mt. Hood, 11,025 feet.

Portland is on the Willamette River, a large stream which flows from south to north down the coast valley and joins the Columbia at the bend, where it turns northward to seek an outlet through the Coast Range, which therefore does not of course appear in the profile. Here again we have found all the topographical elements which combine to shape the western half of our continent.

But in the next section, that defined by the surveys of the Canadian Pacific Railway, they are no longer all recognizable.

THE CANADIAN PACIFIC RAILROAD.

The building of the Canadian Pacific was even more a political necessity than the building of the Union. It followed as a consequence on the admission of British Columbia to the Dominion; nay, rather, it was the price offered to British Columbia as an inducement to join the sisterhood of federated provinces. The surveys were commenced in 1871, and work was begun and languidly prosecuted for years, chiefly in the prairie districts, until the present Company was organized in 1880, when construction was pressed with such energy that the track was completed from end to end last autumn. The Company now owns and operates a continuous line from Quebec to the Pacific, and soon expects to control its own track to the Atlantic seaboard. It therefore divides with the Southern Pacific the advantage of operating a perfectly independent road from tide-water on the Atlantic to tide-water on the Pacific.

The line divides itself naturally into three main sections, distinct in their geographical features.

THE FIRST SECTION is that which follows for part of the way the old *voyageur* route from Montreal to Georgian Bay up the Ottawa and up the Mattawan and along Lake Nipissing. Thence it cuts across country to Lake Huron, and skirts the north shore of that lake and of Lake Superior, running between Lakes Superior and Nipigon to Port Arthur and Fort William, on Thunder Bay, Lake Superior.

This whole region, from the Ottawa to Fort William, a tract of 670 miles in length with a width of 300 miles between the lakes and Hudson Bay, covering therefore an area of 200,000 square miles, is to all intents and purposes unexplored. The cold is not more excessive than in the province of Quebec, and the snow-fall is less, but most of the land is unfit for settlement, and there seem to be no such pine forests (unless perhaps in the valley of the Spanish River) as give immediate available value to the valleys of the St. Maurice, the Ottawa, and its eastern tributaries. But it is intersected at distances of about twenty-five miles by large and rapid rivers, along whose valleys, as well as among the labyrinth of lakes which occupy the Height of Land to the north of the Rocky River of Lake Superior, there are extensive areas of land peculiarly fertile in grasses and roots. The azoic and palæozoic rocks which underlie the whole of it are probably as productive of mineral there as elsewhere. At any rate, the Canadian Pacific has opened up a new region on the eastern slope of the continent larger than the whole of New England, New York, Pennsylvania, Virginia, and Ohio, possessing the possibilities of wealth which are attached to every large section of the world's surface.

The real motive, however, for building this section was the military and political necessity of railroad communication between the members of the Confederation, and the speed with which troops were thrown into the northwest last winter justified the wisdom of its construction. Otherwise the Canadian Pacific proper would, like the other Pacific roads, have united with the eastern system of United States roads at or near the northwest end of Lake Superior.

The mention of Lake Nipigon recalls the doings of one of the paladins of northwestern exploration, whose exploits have been strangely overlooked in our day. In 1731 Varenne de la Verandraye was commandant of the French fort of Lake Nipigon, and heard the same stories of Lake Winnipeg and the country beyond, which the Jesuit Fathers, who ministered at the Mission of the Holy Spirit on Lake Superior, had recorded in their *Relations* half a century before. They fired him with the true enthusiasm of adventure, and, aided by a Canadian commercial house and permission from the French crown, he spent the remainder of his life in exploring the routes of the Northern and Canadian Pacific railroads more than half a century before Lewis and Clark's day. He ascended the Missouri to the Rocky Mountains, but did not cross them. Subsequently he explored the Assiniboine and Saskatchewan, dying almost on the summit of the Rockies in 1749, trying to reach the great Bitter Sea which his Indian guides told him was so near.

This northern zone of the continent though so cold, or rather because so cold, was better known than any toward the south, till we reach the Spanish provinces of Mexico and California. The French had tracked it for furs, and they had established in it missions and trading stations. Contemporaneously the Hudson Bay Company was trafficking with the Indians for their furs at posts along the margin of Hudson Bay.

The two Canadian companies of fur traders consolidated in 1805 into the Northwest Company, which had its head-quarters at Fort William, and drew its furs from every stream of the great prairies and mountains to the very shores of the Pacific; with it the Hudson Bay Com-

pany soon competed for the peltries of the interior. It was to check or share their trade that Astor sent out his expedition to found Astoria on the Columbia River. I have already mentioned Mackenzie's first recorded trip from sea to sea by the Peace River. Fraser, another fur trader, reached the sea by the river which bears his name. But not only had this section of the continent been explored with sledge and canoe by the fur traders, but in its heart, at the confluence of the Red River with the Assiniboine, Lord Selkirk in 1811 had taken steps to found his unhappy colony, recognizing the marvellous fertility of the Manitoba prairies.

His views on many social subjects were as much in advance of his generation as were those of Paterson when he founded his ill-fated Darien Colony. The times were not ripe. Many concurrent circumstances must combine to insure success in great social movements. The movements create the circumstances, and the circumstances again stimulate and propel the movements. But when they originate in some individual effort, no matter how philanthropically noble or theoretically correct, they generally end in disaster. But over their ruins the race advances.

SECOND SECTION.—From Fort William, on Thunder Bay, the road follows the valley of the Kaministiquia and Mattawan for 50 miles till it reaches the low watershed between Lake Superior and Hudson Bay, not far from where this Laurentian ridge, throwing off a spur, deflects its waters, some to the great lakes, some to the Arctic Sea, and some to the Gulf of Mexico. From this point, for 400 miles, till the Red River is approached, the road skirts a chain of these numberless lakes, which here con-

tend with the amphibious land for complete dominion. It is strange in this far northern clime to find vegetation growing so rank as to build up land in the water. Yet the *muskeg* or *sink-hole* of these vast swamps is the outgrowth of such floating islands as surprised the Spaniards in the Lake of Tezcuco and so seriously obstruct the navigation of the Upper Nile. Here they seem to be solid land till the railway builder commences to weight them down with his embankment, when their hollowness becomes apparent. At Barclay the road crossed a *muskeg* beneath which, it was estimated, from the amount of filling required, that there must have been a cavity 200 feet deep. It is unnecessary to point out through what a different climate and country the road passes from that traversed by its southern rivals. The lake region, it is true, commences within the confines of the Northern Pacific. There the lakes offer an agreeable diversion from the land; here the land unfortunately has to be looked for as a diversion from the water. Farther south the land languishes for want of moisture; here it is drowned by a surfeit of water. Happily in THE THIRD SECTION, the prairie division, the balance between land, and water, rain-fall and drought, is better maintained than in any prairie region of the whole west; and were it not for the great cold of the winter months, the fertile belt of the provinces of Manitoba, Assiniboia and Alberta, for 800 miles westward from Winnipeg to Calgary, would claim undisputed pre-eminence in value as farming and grazing land over the regions tributary to any of the southern roads. The remarkable leniency of the climate along the base of the Northern Rockies, even as far north as Lake Athabasca, has always been a matter of sur-

prise, and is more or less a meteorological puzzle. It is, however, a fruitful fact to the Canadian Pacific.

From the rim of Lake Superior to the Red River, near its discharge into Lake Winnipeg, you see from the profile with what a regular down-grade the road follows the water highway. From Winnipeg west it ascends another grade in the valleys of the Assiniboine and Saskatchewan. The country traversed rises by three steppes: that of the Red River, with an elevation of 800 feet, through that of the Qu'Appelle district, whose elevation is 1,600 feet, to the Calgary plateau, with an average altitude of 3,000 feet. At Mosleyville the foot-hills are reached, and at Padmon, 904 miles from Winnipeg, the main range is entered through the Bow River Pass. The ascent thence is easy to the summit, where at 960 miles from Winnipeg, from twin lakes nestling in a valley four miles wide, two streams flow, one to the Atlantic, another to the Pacific. The mountains rise formidably on each side the valley, but the Divide is passed by grades which, except for the upper five miles of the Bow River, where they attain 116 feet to the mile, nowhere exceed 40 feet. Thus the Rocky Mountains are crossed at an elevation of 5,300 feet, through a grassy vale with glacier-clad mountains towering from 5,000 to 6,000 feet on either side, displaying all the sublimity from height and ruggedness of the Colorado mountains, in contrast with forest and verdure more suggestive of Alpine scenery than any thing upon the continent. Down the west-bound stream the track follows the Kicking-Horse River for 47 miles, to the Columbia, here flowing in a broad stream to the northwest. Down the Columbia River it descends, though here this glorious stream, which begins with

a width of a mile, is rather a long, sinuous lake than a river. The Selkirk Range lies coastward, and over it the road now passes by aid of the Beaver River valley at an elevation of 4,300 feet, to again meet and cross the Columbia now flowing southwest. The grades in descending from the main range into the valley where the Columbia is first crossed, in ascending the Selkirk Range, and in again descending by the Ille-Cille-Wact into the Columbia valley to cross it by the second bridge, are for shorter distances 116 feet to the mile. Another range has still to be crossed, the Gold Range, by the Eagle Pass, the three ranges following like waves of decreasing volume. Westward of the Gold Range the road enters the valley of the South Thompson, and skirts the banks of the Shuswap Lake (with one leap over an obstructing promontory) and the South Thompson River to Kamloops, where the North and South Thompson unite and discharge their streams into Kamloops Lake.

From Kamloops the road follows the lake, and the Thompson, and finally the Fraser River through the gorge which it has cut through the Cascade Range. At the mouth of the gorge is Yale, and fifteen miles below is Hope.

Below Yale the waters become tamer, and at Hope they are navigable for river-boats to Westminster, a port of capacity sufficient for the largest ships. Twenty-six miles from Port Hammond, where the railroad leaves the Fraser River, is Vancouver, the terminus of the road.

To identify the geographical features of the section is more or less guesswork. The first and highest range crossed is undoubtedly the Rockies. The last range, not crossed by the railway, but penetrated by the gorge of the Fraser, is generally identified with the southern Coast

Range. It more correctly corresponds, I think, to the prolongation of the Sierra Nevada, the Gulf of Georgia occupying the coast valley, and the Coast Range surviving in the island of Vancouver and the Queen Charlotte group. The intermediate ranges, the Selkirk and the Gold, are probably homologous with the Wasatch and Humboldt, but the crushing together of the whole mountain system has obliterated the great valleys; and the change in climate, resulting in the creation of numerous large and impetuous rivers, has introduced corroding modifying influences not so appreciably felt in the configuration of the southern mountain and valley system. From the base of the Rockies at Cheyenne, on the Union Pacific, to the foot of the Sierra Nevada at Colfax is 885 miles. On the Northern Pacific route, about 500 miles north of the Central Pacific, between corresponding points the mountain system is 500 miles wide, whereas from the base of the Rockies here to what we may assume to be the base of the Sierra chain is only 330 miles.

The scenery of the mountains in this parallel is modified not only by these geographical variations but by the heavy clothing of forest trees. The lumber traffic will be a source of large revenue to the railroad, and one which will grow rapidly in value, for lumber is already becoming scarce on the Pacific. The devastation of the forests of California and Oregon is being carried on with even more ruthless waste than that with which ours are being swept away. It is not in the nature of a Californian to plant for posterity a sapling to replace the tree he cuts down. The thick covering of soil and timber will seriously interfere with and retard prospecting for mineral, but as the arbitrary line between the United States and

the British provinces does not probably limit the deposits of valuable minerals, they will be gradually discovered, and more gradually exhausted than our own. The magnificent scenery is also, not without warrant, counted upon as one source of revenue to the railroad.

CONCLUSIONS.

This rapid sketch may be appropriately supplemented by a table of distances:

UNION & CENTRAL RAILROAD.

San Francisco to Omaha	-	-	-	-	-	1,865 miles.
Omaha to New York	-	-	-	-	-	1,412 "
San Francisco to New York	-	-	-	-	-	3,277 miles.
New York to Liverpool	-	-	-	-	-	3,065 "
San Francisco to Liverpool	-	-	-	-	-	6,342 miles.
Yokohama to San Francisco	-	-	-	-	-	4,731 "
Yokohama to Liverpool	-	-	-	-	-	11,073 miles.

3,277 miles being by rail and 7,796 miles by water.

SOUTHERN PACIFIC RAILROAD.

San Francisco to New Orleans	-	-	-	-	-	2,476 miles.
New Orleans to New York, by sea	-	-	-	-	-	2,519 "
San Francisco to New York	-	-	-	-	-	4,995 miles.
New Orleans to Liverpool	-	-	-	-	-	4,767 "
San Francisco to Liverpool	-	-	-	-	-	7,243 miles.
Yokohama to San Francisco	-	-	-	-	-	4,731 "
Yokohama to Liverpool	-	-	-	-	-	11,974 miles.

2,476 miles being by rail and 9,498 miles by water.

ATCHISON, TOPEKA, & SANTA FÉ.

San Francisco to Kansas City, via Deming	-	-	2,347	miles.
Kansas City to New York	-	-	1,251	"
San Francisco to New York	-	-	3,598	miles.

ATLANTIC & PACIFIC, AND ATCHISON, TOPEKA, & SANTA FÉ.

San Francisco to Kansas City	-	-	2,099	miles.
Kansas City to New York	-	-	1,251	"
San Francisco to New York	-	-	3,350	miles.

NORTHERN PACIFIC RAILROAD.

Portland to St. Paul	-	-	1,911	miles.
St. Paul to New York	-	-	1,120	"
Portland to New York	-	-	3,031	miles.
New York to Liverpool	-	-	3,065	"
Portland to Liverpool	-	-	6,096	miles.

CANADIAN PACIFIC RAILROAD.

Port Moody to Montreal	-	-	2,868	miles.
Montreal to Liverpool	-	-	2,820	"
Port Moody to Liverpool	-	-	5,688	miles.
Yokohama to Port Moody	-	-	4,336	"
Yokohama to Liverpool	-	-	10,024	miles.

* You will perceive that the comparison of distances from sea to sea is in favor of the Southern Pacific, but the comparison of profiles slightly favors the Canadian Pacific. This road also stands second on the list as regards distances. These advantages lie, therefore, between the most northerly and the most southerly of the six competitors. Climate is, however, an important factor when we

are judging of the commercial value of each route, and we must remember that the degree of cold and the snow-fall are influenced by altitude even more than by latitude. Hence the Canadian and the Central in this respect stand almost on a par. The road most favorably situated as regards climate is the Southern; but the semi-tropical rains of Southern California and Texas are at times as obstructive to traffic as the snows of the north. No road, therefore, can claim such geographical superiority over its rivals as to give it supreme advantage, and therefore relieve it from the necessity of maintaining a conciliatory attitude towards its competitors and its customers.

A few words as to the products—in men and material—which the building of this vast system of roads, with their aggregate of over 23,000 miles of track, has created. They have to all intents and purposes doubled the available area of this country and Canada, and done it in the short period of twenty years. The sudden opening up of the great West has, therefore, of necessity had momentous consequence upon the character, not only of those who have peopled it, but by reaction upon all classes, even those farthest removed in occupation or locality. Certainly one of the most important influences has been the pernicious effect which the handling of such enormous sums as have been expended on these railroads has had on the political and financial morality of our great centres of government and trade; and the chief wealth of the West having been in the precious metals, a spirit of gambling has been generated both in those who work the mines and those who speculate in their actual or possible production. As the money so rapidly spent on the railroads, and that gathered as rapidly from the

gold and silver mines, together amounts to over three and a half billions of dollars, the effect on society has been notable, and unfortunately not healthy.

It was the discovery of gold in California, and the rush thither to reap a golden harvest without sowing any seed, which stimulated the peopling of the west coast; and it was the Mormon exodus from Illinois, the very same year, and the conversion by these religious fanatics of a tract of country in the very heart of the great desert into an oasis of beauty and fertility, which proved that the mountains would yield other products than the precious metals. Miners and Mormons were, therefore, the elementary material out of which Western life was originally composed.

Gold was the influence that first drew the mobile wave of restless humanity to each section of the mountains in succession, to California in the west, to Colorado in the east, Montana in the north, Arizona in the south. But in searching for gold, silver was discovered, a metal more important to local industry than gold, owing to the greater intricacy of the metallurgical treatment required to win it from its ores. Until 1880, precious-metal mining alone was assisted by the railroad, but in that year Arizona and Montana, being brought within the radius of the world's markets, copper appears as a still more important tribute to the freight-traffic of the West. At present gold, silver, copper, and coal, are its staple mineral products. The output of the last is naturally restricted in quantity by the necessarily limited local demand. The three former have, however, been mined on a scale which the world has not hitherto witnessed, and with that reckless disregard to economy which has characterized all

western enterprises. In a wonderfully short space of time, even when life was insecure, and the Indian was almost the undisputed master of the plains and mountains, an army of prospectors scattered themselves over the whole region, searching in the most inaccessible spots for the precious metals. A region one thousand miles wide by two thousand long, rich in minerals, and utterly virgin ground, was scoured. practically bare of soil and unconcealed by forest, and therefore exploration was easy and discovery rapid; but hardly more rapid than the avidity with which the discoveries once made were utilized.

As proof of this, look at the statistics of the precious metals since 1849. Between that date and 1885 the Rocky Mountains yielded about \$2,370,000,000 in gold and silver. The Comstock lode alone produced from 1860 to 1880 \$306,000,000 in gold and silver.

It is worthy of note that on the construction and equipment of the twenty odd thousand miles of railroad in the Rocky Mountain system there were spent \$1,267,000,000, or considerably more than one half the total production of the precious metals.

Despite the relatively small value of copper, its mining and reduction have been pursued with the same wasteful haste. The great enterprises were undertaken when the cost of the metal was much higher than at present. They were planned on a magnificent scale, and when started so frightened the world by their production, that they drove the price down to less than one half. Having been started, they will continue to be run till poverty of ore stops them, as it has stopped the Comstock. I do not mean to say that the wealth of the

West is exhausted, or that great metalliferous deposits will not yet be discovered. But what happened in the early days after the conquest of Mexico is being re-enacted to-day. Within a generation of the conquest nearly all the great mines of Mexico had been discovered, and the cream was rapidly skimmed off them. Yet some of them have been worked almost without interruption, and that profitably, till our day. So, while there is little likelihood that prospecting will be as profitable in the future as it has been in the past, it is as certain that through the beneficial stress of poverty, with which nature sooner or later corrects our extravagance, mining and metallurgy will become more and more of a business and less of a gambling game, to the great gain of both the East and the West.

But the opening of the West has created other fields of industry. The farming land is limited, though everywhere extensive enough to supply the needs of the scanty population ever likely to be dependent on it; but the grazing lands are, comparatively speaking, illimitable. These are being rapidly occupied by cattle only a little less wild than the buffaloes, and by herders as reckless and restless as the miners. There has, therefore, through the influence of their isolated out-door life, passed far from the restraints of society, been rapidly developed a race of herdsmen, prospectors, miners, ranchers, acting under very different impulses from those which kept the New England and Virginia colonists content with their narrow home between the Atlantic and the Alleghanies. These men of the West are the real *coureurs des bois* of our day, and all the acts of Congress would be as powerless to restrain their active independence, as were the *édits et ordonnances* of the

French governors to check the roving habits of their predecessors. Were there a new country to explore, these would be the men to do it. Let there be a great gold discovery in central Africa or New Guinea, and a contingent will start from the Rockies by the earliest train to catch the first steamer, with no baggage but a pair of blankets, and they will reach their goal, be it where it may.

But I must close. After this survey of what has been done in railroad building west of the Missouri since 1862, I think that whether or not you admit the proposition with which I started, that our worthy ancestors were lacking in the spirit of adventure, you will allow that our contemporaries are not deficient in the spirit of enterprise.

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